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Thermal Conductivity Test Results
Bristol Electric System
Bristol, Tennessee

Earth Energy Engineering performed a thermal conductivity test at the Bristol Electric System in Bristol, Tennessee on December 9, 1998. Testing was done by Bill Nagle with a Ewbank portable test unit.

Borehole

The test borehole was 335 feet in depth and 5" in diameter. A 1" inch loop was installed and the borehole was backfilled with #8 stone. Static water level was reported at 30 feet. The driller reported the formation was primarily black shale. The borehole produced over 100 gpm of water.

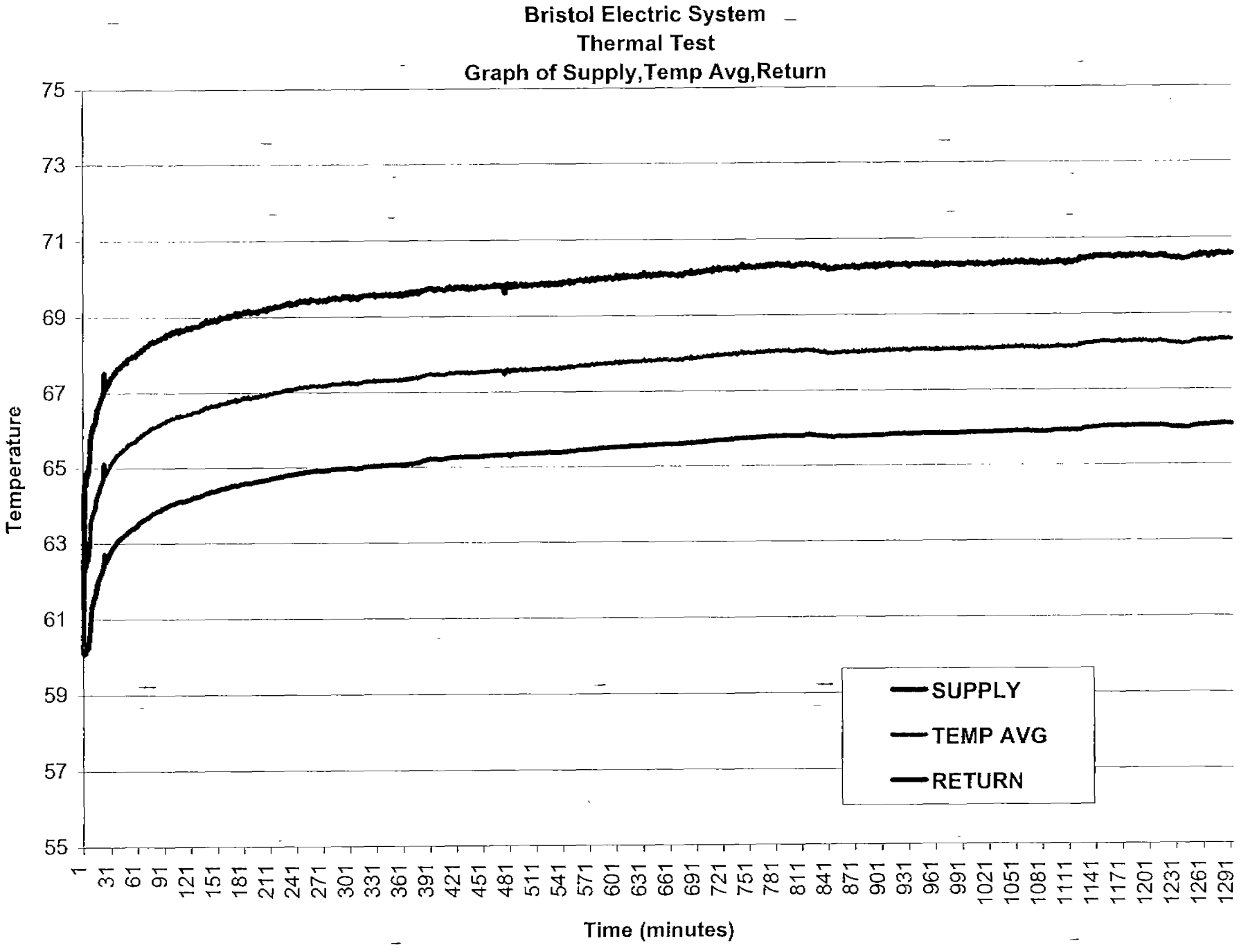
Thermal Conductivity

The average thermal conductivity **(k)** for this borehole has been influenced by other factors. Most likely, water is flowing from an upper zone into a lower fracture in the shale. The stone backfill allows this movement. The flow of water removes heat from the borehole, and makes the thermal conductivity value unrealistically high. The calculated value of heat transfer is equivalent to dense granite. Although this situation makes the borehole very efficient for heat transfer, the water movement may not continue over a long-term period.

A reasonable thermal conductivity **(k)** value for the borehole is **1.1 to 1.2 btu/degree F-hr-foot**. This is an average conductivity per foot for the borehole. This value represents the rate at which the borehole and soil will transfer heat. It is an important variable in determining the amount of ground heat exchanger required for a given system.

Methods and Procedures

All test equipment, methods, procedures, calculations, and interpretation is done in accordance with the recommendations and guidelines of the International Ground Source Heat Pump Association.


Bristol Electric System
Thermal Test
Graph of Supply,Temp Avg,Return
Temperature
75
73
71
69
67
65
63
61
59
57
55
1
31
61
91
121
151
181
211
241
271
301
331
361
391
421
451
481
511
541
571
601
631
661
691
721
751
781
811
841
871
901
931
961
991
1021
1051
1081
1111
1141
1171
1201
1231
1261
1291
Time (minutes)
SUPPLY
TEMP AVG
RETURN

Bristol Electric System
Thermal Test
Graph of Log Time of Temp Avg